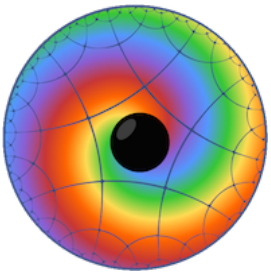

Contribution ID: **57** Type: **not specified**

Holographic graphene bilayers

Wednesday, 15 April 2015 10:50 (30 minutes)

The possibility of inter-layer exciton condensation in holographic models of a strongly coupled double monolayer Dirac semi-metal are studied in detail. It is showed that, when the charge densities on the layers are exactly balanced so that, at weak coupling, the Fermi surfaces of electrons in one monolayer and holes in the other monolayer would be perfectly nested, inter-layer condensates can form for any separation of the layers. The case where both monolayers are charge neutral is special. There, the inter-layer condensate occurs only for small separations and is replaced by an intra-layer exciton condensate at larger separations. The phase diagram for charge balanced monolayers for a range layer separations and chemical potentials is found. We also show that, in semi-metals with multiple species of massless fermions, the balance of charges required for Fermi surface nesting can occur spontaneously by breaking some of the internal symmetry of the monolayers. This could have important consequences for experimental attempts to find inter-layer condensates.

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Session Classification: Morning session